

Marco Pizzichemi
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RESEARCH TOPICS

Positron Emission Tomography

2011 - present

- Development of heterostructures on scintillating materials to improve time of flight capabilities of PET detectors
- Development of a novel method to extract Depth of Interaction information in PET scanners
- Optimization of optical coupling between scintillators and detectors for the EndoTOFPET-US project
- Characterization of crystal scintillators, fibers, and photo-detectors for the EndoTOFPET-US project
- Coordination of research activity for the ClearPEM project in S. Gerardo Hospital, Monza (IT)
- Optimization of acquisition and data analysis for the clinical activity of the ClearPEM-Sonic project
- Development of the image visualization and analysis software for the ClearPEM-Sonic Positron project

High Energy Physics

2018 - present

- Development of Sapghetti-Calorimeter (SPACAL) technology for the upgrade of the LHCb ECAL at CERN
- Study of radiation hard scintillating materials and photo-detectors
- Development of a Monte Carlo framework for fast simulation of complete LHCb ECAL detector based on different technologies

EDUCATION

University of Milano-Bicocca

PhD in Physics and Astronomy

Milano, Italy

Dec 2009

University of Milano-Bicocca

Master of Science in Physics

Milano, Italy

Sept 2006

ACADEMIC POSITIONS

University of Milano-Bicocca

Researcher (RTD-B)

Milano, Italy

September 2021 – present

University of Milano-Bicocca

Researcher (RTD-A)

Milano, Italy

March 2020 – August 2021

CERN

Research Fellow

Geneva, Switzerland

March 2017 – February 2020

University of Milano-Bicocca

Post-doc

Milano, Italy

Jan 2010 – February 2017

TEACHING EXPERIENCE

Laboratory of Experimental Physics I

Assistant Professor

Physics Degree, Unimib

March 2020 – present

Physics of Radiations

Professor

Neuro and Psychomotor Therapy of the Evolutionary Age Degree, Unimib

November 2021 – present

General Physics

Teaching Assistant

Information Technology Degree, Unimib

Sept 2010 – Aug 2014

Laboratory of Experimental Physics II

Laboratory assistant

Physics Degree, Unimib

Sept 2011 – Aug 2012

TALKS AT INTERNATIONAL CONFERENCES AND WORKSHOPS

- Scintillating sampling ECAL technology for the Upgrade II of LHCb *Vienna Conference on instrumentation* 21-25 February 2022, Vienna, Austria
- ECAL technologies for LHCb Phase 2 Upgrade. *5th Workshop on LHCb upgrade II*, 30 Mar - 1 Apr 2020, Barcelona, Spain
- The electronics of the upgraded LHCb calorimeter system. *Calorimetry for High Energy Frontier (CHEF2019)*, 25-29 November 2019, Fukuoka, Japan
- The Phase 2 Upgrade of the LHCb Calorimeter system. *Calorimetry for High Energy Frontier (CHEF2019)*, 25-29 November 2019, Fukuoka, Japan
- Depth of Interaction information encoding in a sampling scintillator detector geometry. *Nuclear Science Symposium, Medical Imaging Conference - NSS/MIC 2019*, October 26 - November 2, 2019, Manchester, UK
- Improving the Coincidence Time Resolution of PET detectors using the Depth of Interaction information. *70th Crystal Clear Collaboration General Meeting*, 29 November 2018, CERN, Geneva, Switzerland
- Improving the Coincidence Time Resolution of PET detectors using the Depth of Interaction information. *Nuclear Science Symposium, Medical Imaging Conference - NSS/MIC 2018*, November 10-17, 2018, Sydney, Australia
- Report of ASCIMAT activities at CERN. *5th FAST WG2 meeting*, 14 April 2018, Prague, Czech Republic
- Development of a PET module with DOI and timing capabilities. *69th Crystal Clear Collaboration General Meeting*, 12 April 2018, Prague, Czech Republic
- Development of a high resolution module for PET scanners *4th FAST annual meeting*, 8-9 March 2018, Bucharest, Romania
- ClearPEM project status report. *66th Crystal Clear Collaboration General Meeting*, 24 November 2016, CERN, Geneva, Switzerland
- Positron Emission Tomography: State of the Art and Future Developments. *International Conference Frontiers in Diagnostic Technologies*, 30 March - 1 April 2016 Frascati, Italy
- Development of EndoTOFPET-US, a multi-modal endoscope for ultrasound and time of flight positron emission tomography. *12th Topical Seminar on Innovative Particle and Radiation Detectors - IPRD13*, 7-10 October 2013, Siena, Italy
- ClearPEM-Sonic: a multimodal PET-ultrasound mammography system. *Calorimetry for High Energy Physics - CHEF 2013*, 22-25 April 2013, Paris, France
- Ray Tracing Simulations in Scintillators: a Comparison Between SLitrani and Geant4. *Nuclear Science Symposium, Medical Imaging Conference - NSS/MIC 2012*, October 29 - November 3, 2012, Anaheim, California, USA
- Effect of different conditions on bacterial inactivation of pulsed electric field (PEF) treatment. *International Conference Bio and Food Electrotechnologies - BFE 2012*, 25-28 September 2012, Salerno, Italy
- Image fusion software in the ClearPEM-Sonic project. *13th International Conference on Astroparticle, Particle, Space Physics and Detectors for Physics Applications - ICATPP 2011*, 3-7 October 2011, Como, Italy
- A Pulsed Electric Field (PEF) bench static system to study bacteria inactivation. *12th Topical Seminar on Innovative Particle and Radiation Detectors - IPRD10*, 7-10 June 2010, Siena, Italy

PUBLICATIONS

- [1] G. Terragni, et al., Time Resolution Studies of Thallium Based Cherenkov Semiconductors, *2022 Frontiers in Physics*, doi: 10.3389/fphy.2022.785627.
- [2] R. Aail et al., Study of Z Bosons Produced in Association with Charm in the Forward Region, *2022 Physical Review Letters*, doi: 10.1103/PhysRevLett.128.082001.
- [3] R. Aail et al., Evidence for a New Structure in the $J/\psi p$ and $J/\psi p^-$ Systems in $B_s^0 \rightarrow J/\psi p p^-$ Decays, *2022 Physical Review Letters*, doi: 10.1103/PhysRevLett.128.062001.
- [4] R. Aail et al., Identification of charm jets at LHCb, *2022 Journal of Instrumentation*, doi:10.1088/1748-0221/17/02/P02028.
- [5] R. Aail et al., Measurement of $\chi_{c1}(3872)$ production in proton-proton collisions at $\sqrt{s} = 8$ and 13 TeV, , doi:10.1007/JHEP01(2022)131.
- [6] R. Aail et al., Study of B_c^+ decays to charmonia and three light hadrons, *2022 Journal of High Energy Physics*, doi:10.1007/JHEP01(2022)065.
- [7] R. Aail et al., Search for the radiative $\Xi_b \rightarrow \Xi - \gamma$ decay, *2022 Journal of High Energy Physics*, doi:10.1007/JHEP01(2022)069.
- [8] R. Aail et al., Measurement of the W boson mass, *2022 Journal of High Energy Physics*, doi: 10.1007/JHEP01(2022)036.
- [9] R. Aail et al., Observation of the suppressed $\Lambda_b^0 \rightarrow dpK^-$ decay with $D \rightarrow k+\pi^-$ and measurement of its CP asymmetry, *2021 Physical Review D*, doi:10.1103/PhysRevD.104.112008.
- [10] R. Aail et al., Angular analysis of the rare decay $B_s^0 \rightarrow \phi \mu^+ \mu^-$, *2021 Journal of High Energy Physics*, doi:10.1007/JHEP11(2021)043.
- [11] R. Aail et al., Measurement of J/ψ production cross-sections in pp collisions at $\sqrt{s} = 5$ TeV, *2021 Journal of High Energy Physics*, doi:10.1007/JHEP11(2021)181.
- [12] R. Aail et al., Updated search for B_c^+ decays to two charm mesons, *2021 Journal of High Energy Physics*, doi:10.1007/JHEP12(2021)117.
- [13] R. Aail et al., Search for the doubly charmed baryon Ξ_{cc}^+ in the $\Xi_c^+ \pi^+ \pi^+$ final state, *2021 Journal of High Energy Physics*, doi:10.1007/JHEP12(2021)107.
- [14] R. Aail et al., Simultaneous determination of CKM angle γ and charm mixing parameters, *2021 Journal of High Energy Physics*, doi:10.1007/JHEP12(2021)141.
- [15] N. Efthimiou, M Pizzichemi et al., TOF-PET image reconstruction with multiple timing kernels applied on Cherenkov radiation in BGO, *2020 IEEE Transactions on Radiation and Plasma Medical Sciences*, doi: 10.1109/TRPMS.2020.3048642.
- [16] A Zatcepin, M Pizzichemi et al., Improving depth-of-interaction resolution in pixellated PET detectors using neural networks. *2020 Physics in Medicine and Biology*, 65(17), 175017, doi: 10.1088/1361-6560/ab9efc
- [17] M Pizzichemi, The Phase II upgrade of the LHCb calorimeter system. *2020 Journal of Instrumentation*, 15(5), C05062, doi: 10.1088/1748-0221/15/05/C05062
- [18] S Decker, M Pizzichemi et al., The Digital-Analog SiPM Approach: A Story of Electronic and Excess Noise. *2019 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC), Manchester, UK, 2019*, pp. 1-5, doi: 10.1109/NSS/MIC42101.2019.905979
- [19] M Pizzichemi et al., On light sharing TOF-PET modules with depth of interaction and 157 ps FWHM coincidence time resolution. *2019 Physics in Medicine and Biology*, doi: <https://doi.org/10.1088/1361-6560/ab2cb0>

- [20] G Stringhini, M Pizzichemi et al. Development of a high resolution module for PET scanners, *2017 Journal of Instrumentation*, 12 C02073
- [21] M Pizzichemi et al., A new method for depth of interaction determination in PET detectors. *2016 Physics in Medicine and Biology*, 61 (12) 4679
- [22] G Stringhini, M Pizzichemi et al. Development and evaluation of a practical method to measure the Depth of Interaction function for a single side readout PET detector *2016 Journal of Instrumentation* 11 P11014
- [23] M Pizzichemi, Positron Emission Tomography: state of the art and future developments, *2016 Journal of Instrumentation*, 11 (08) C08004
- [24] Z Liu, M Pizzichemi et al., In-depth study of single photon time resolution for the Philips digital silicon photomultiplier. *2016 Journal of Instrumentation*, 11 (06) P06006
- [25] R Martinez Turtos, M Pizzichemi et al. Measurement of LYSO Intrinsic Light Yield Using Electron Excitation. *2016 IEEE Transactions on Nuclear Science*, 63 (2) 475-479
- [26] Z Liu, M Pizzichemi et al., Performance study of Philips digital silicon photomultiplier coupled to scintillating crystals. *2016 JINST* 11 P01017
- [27] T Niknejad, M Pizzichemi et al., Development of high-resolution detector module with depth of interaction identification for positron emission tomography. *Nuclear Instruments and Methods in Physics Research A* (2016), <http://dx.doi.org/10.1016/j.nima.2016.04.080i>
- [28] Z Liu, M Pizzichemi et al., Quality control of the TSV multi-pixel photon counter arrays, and modules for the external plate of EndoTOF-PET ultrasound detector. *2015 NIM A* 787 pp 240-244
- [29] E Auffray, M Pizzichemi et al., Characterization studies of Silicon Photomultipliers and crystals matrices for a novel time of flight PET detector. *2015 Journal of Instrumentation*, 10 (06) P06009
- [30] G A Fornaro, M Pizzichemi et al., E Auffray, Study of the Angular Distribution of Scintillation Photons. *2014 IEEE Transactions on Nuclear Science* 61 (1) 456-461
- [31] S Bonetta, M Pizzichemi et al., Inactivation of Escherichia coli and Staphylococcus aureus by Pulsed Electric Fields Increases with Higher Bacterial Population and with Agitation of Liquid Medium. *2014 Journal of Food Protection* 77 7 pp. 1219-1223
- [32] M. Pizzichemi, Development of EndoTOFPET-US, a multi-modal endoscope for ultrasound and time of flight positron emission tomography. *2014 Journal of Instrumentation* 9 02 C02002.
- [33] G Cucciati, M Pizzichemi et al. Development of ClearPEM-Sonic, a multimodal mammography system for PET and Ultrasound. *2014 Journal of Instrumentation* 9 (03), C03008
- [34] M Lucchini, M Pizzichemi et al., Response of Inorganic Scintillators to Neutrons of 3 and 15 MeV Energy. *2013 IEEE Transactions on Nuclear Science* 61 (1) 472-478
- [35] E Auffray, M Pizzichemi et al. A Comprehensive and Systematic Study of Coincidence Time Resolution and Light Yield Using Scintillators of Different Size, Wrapping and Doping. *2013 IEEE Transactions on Nuclear Science* 60 (5) 3163-3171
- [36] N Aubry, M Pizzichemi et al., EndoTOFPET-US: a novel multimodal tool for endoscopy and positron emission tomography. *2013 Journal of Instrumentation* 8 C04002
- [37] S Gundacker, M Pizzichemi et al., Time of flight positron emission tomography towards 100ps resolution with L(Y)SO: an experimental and theoretical analysis. *2013 Journal of Instrumentation*, 8 (07), P07014
- [38] M. Pizzichemi, EndoTOFPET-US: Towards a Multi-Modal Endoscope for Ultrasound and Time of Flight PET. *2013 IEEE NSS-MIC Conference Record* 1-5

- [39] M Pizzichemi et al., Ray Tracing Simulations in Scintillators: a Comparison Between SLitrani and Geant4. *2012 IEEE NSS-MIC Conference Record* pp 1712-1716
- [40] M Pizzichemi et al., Image fusion software in the ClearPEM-Sonic project. *2012 211 13th ICATPP Conference Record* pp 1036-1041
- [41] E Auffray, M Pizzichemi et al., Design and Performance of Detector Modules for the Endoscopic PET Probe for the FP7 Project EndoTOFPET-US. *2012 IEEE NSS-MIC Conference Record*
- [42] E Auffray, M Pizzichemi et al., A Comprehensive and Systematic Study of Coincidence Time Resolution and Light Yield Using Scintillators of Different Size, Wrapping and Doping. *2011 IEEE NSS-MIC Conference Record*
- [43] P Cortese, M Pizzichemi et al., A Pulsed Electric Field (PEF) bench static system to study bacteria inactivation. *Nuclear Physics B (Proc. Suppl.)*. 215 (2011) 162-164.
- [44] M Pizzichemi, Pulsed Electric Field inactivation of microbial cells: the use of ceramic layers to increase the efficiency of treatment. *Nuclear Physics B (Proc. Suppl.)*. 197 (2009) 374-377.
- [45] M Pizzichemi, Application of Pulsed Electric Fields to food treatment. *Nuclear Physics B (Proc. Suppl.)*. 172 (2007) 314-316.

PATENTS

- Scintillator array for gamma ray or X-ray detection with Depth of Interaction information, Ref. PCT/EP2015/074462